4.2 Introduction of Analytical Framework – Example FMPs

Four policy alternatives, and a preliminary preferred alternative, are under consideration in this document. In order to provide sufficient detail to the analysis of the policies, each alternative is accompanied by, and associated with, a FMP framework consisting of a set of example FMPs. A description of the framework concept, followed by a summary of each alternative policy and their associated FMPs, is provided below.

4.2.1 Concept of the Analytical Framework

Each alternative comprises three elements: a management approach statement that describes the goals of, and rationale and assumptions behind the alternative; a set of management objectives that complement and further refine the goals set forth in the management approach; and, except for Alternative 1 (status quo), a pair of example FMP "bookends" that illustrate and frame the range of implementing management measures for that alternative. The management approach statement and objectives serve to define the direction the NPFMC and NOAA Fisheries wish to follow in the management of the fisheries. The example FMP bookends serve two purposes: first, they provide an additional level of analytical detail that will facilitate the comparison of the physical, biological, and socioeconomic effects of the alternatives and the status quo; second, they provide the public with an illustration of the types of management measures the NPFMC and NOAA Fisheries envision it will use to achieve the goals of the alternative. Ultimately, the preferred alternative will include a policy statement accompanied by a set of management objectives and a set of example FMP bookends that will illustrate a range of management actions that further the selected policy. This FMP framework structure will communicate to the public the NPFMC and NOAA Fisheries' intent as to how they plan to pursue its policy objectives in the future. By providing, as part of its preferred alternative, a range of potential management measures (as illustrated by the example FMP bookends), management flexibility is maintained under the MSA to adaptively manage the fishery through FMP amendments.

4.2.2 Description of the Example FMP Frameworks

Alternative 1 – Continue Under the Current Risk Averse Management Policy

Under this alternative, the groundfish fisheries would continue to be managed based upon the present risk-averse policy. Alternative 1(a) represents the policy language currently stated in the FMPs, dating from 1979 and 1985 for the BSAI and GOA FMPs, respectively (see Section 2.6.1 for the full text of the alternative). These policies, based on the best scientific information available, avoid irreversible or long-term averse effects on fishery resources and the marine environment, while at the same time providing for optimum yield.

Alternative 1(b) is a substitute for the written policy language in the current FMPs and would include objectives that specifically address the variety of concerns that are balanced in current management considerations (see Section 2.6.2 for the full text of the alternative). Alternative 1(b) encapsulates a risk-averse conservation and management program that is based on a conservative harvest strategy. This policy assumes that fishing does result in some adverse impacts to the environment and that, as these impacts become known, mitigation measures will be developed and appropriate FMP amendments will be implemented.

FMP 1 (Current BSAI and GOA Groundfish FMPs)

The Alternative 1(a) and 1(b) policies are both represented by FMP 1, which is the current fisheries management program for the BSAI and the GOA and incorporates management measures approved by the NPFMC through the June 2002 meeting. FMP 1 is described in full in Table 4.2-1.

In the current FMPs, the TAC is determined annually based on a conservative harvest strategy that calculates the OFL and the ABC for each managed stock or stock complex. The current FMPs specify the OFL and maximum ABC (max_{ABC}) by means of a six-tier system wherein the amount and quality of information available for a given stock or stock complex determine the formula that is used to define F_{OFL} and max F_{ABC} (Tiers 1-5) or OFL and max_{ABC} directly (Tier 6). Most stocks are currently managed under Tier 3, where max F_{ABC} equals $F_{40\%}$ if biomass is above $F_{40\%}$. Precautionary adjustments are made, including decreasing F_{OFL} and F_{ABC} linearly with biomass whenever biomass falls below a tier-specific reference level, but only Tier 1 stocks include an uncertainty variation in max_{ABC}. The status of each stock in Tiers 1-3 is also examined annually with respect to the MSST, as defined in the National Standard Guidelines.

OY is specified in the current FMPs as a range that is aggregated across all stocks and does not vary with biomass. The current FMPs require the sum of the individual groundfish TACs to fall within the OY range. In the BSAI, the high end of the range, 2 million mt, acts as a cap on the TACs, as the aggregated ABCs regularly exceed this limit. In practice, although it is not required in the current FMPs, TACs are never set higher than the corresponding ABCs. Taking into account the ecosystem considerations of the food web, the FMPs also prohibit directed fishing for forage species.

Through amendments over the last twenty years, the current FMPs have built up a network of spatial/temporal closed areas, intended to protect resources of concern, as well as to minimize gear conflicts. In the BSAI, various areas around the Pribilof Islands and in Bristol Bay are closed year-round to trawling in order to protect red and blue king crab habitat, and a chinook and a chum salmon area are closed seasonally. Also in the BSAI, waters within 12 nautical miles (nm) of theWalrus Islands are closed to groundfish fishing to minimize disturbance of walrus haulouts. In the BSAI and the GOA, Steller sea lion protection measures permanently close the area within 3 nm of rookeries to fishing, as a no-transit zone. Additionally, they impose trawl prohibitions within 10-20 nm of all rookeries and haulouts, and prohibit fishing in Seguam Pass. In the GOA, trawling is prohibited in southeast Alaska west of 140°W. Also, a 2.5 nm^2 area designated as the Sitka Pinnacles Marine Reserve in the GOA is closed to groundfish fishing to protect habitat for rockfish and lingcod (Figure 4.2-1).

The current BSAI FMP prohibits directed fishing for pollock with non-pelagic trawl gear. There is no similar restriction on pollock trawling in the current GOA FMP. Directed fishing for sailfish with longline pot gear is prohibited in the GOA. Non-pelagic trawling is prohibited in the Bristol Bay Red King Crab Savings Area in the BSAI and in the Cook Inlet in the GOA. Additionally, various areas around Kodiak Island are closed to non-pelagic trawling either year-round or seasonally to protect crab stocks (Figure 4.2-1; specific details on the FMP 1 map illustration are provided in Section 4.2.3).

Groundfish fisheries in the BSAI and GOA are required to discard any incidental catch of halibut, salmon, crab, herring, or Steelhead trout, known collectively as prohibited species. The FMPs currently set PSC limits on many of these species, with penalties ranging from closure of a particular zone or of the whole

management area to a directed fishery or fisheries for a specified season or for the remainder of the year. In the BSAI FMP, stairstep limits for trawl bycatch within specified zones are set for red king crab and C. bairdi crab. The catch limit varies based on stock abundance. The BSAI FMP also specifies an absolute trawl catch limit for chinook salmon and "other salmon" within specified zones. Once the apportioned PSC limit for a trawl fishery is reached within a zone, the fishery is prohibited from fishing within that zone. The BSAI FMP specifies a trawl catch limit for herring in the BSAI at one percent of annual biomass. Catch limits on C. opilio crab and halibut bycatch in the BSAI are established in regulation. The C. opilio catch limit applies to a specified zone and is based on an adjusted percentage of biomass that must fall within a certain range. The halibut catch limit is a BSAI-wide mt limit and is based on halibut mortality. In the GOA FMP, catch limits on halibut bycatch are authorized and set by the NPFMC as part of the annual procedure for setting groundfish harvest levels. There are no other PSC limits set in the GOA.

Other bycatch reduction measures are required under FMP 1. The Increased Retention/Increased Utilization (IR/IU) program requires full retention, by vessels fishing for groundfish, of all pollock and Pacific cod fit for human consumption, as well as full utilization of the two species by inshore processors. A minimum utilization standard of 15 percent is set for all at-sea processors. The NPFMC is also adopting a policy to require full retention of Demersal Shelf Rockfish by hook-and-line and jig vessels in the Southeast Outside District of the GOA. A Vessel Incentive Program (VIP) encourages bycatch reduction by setting bycatch reduction standards biannually. If a vessel fails to meet these standards, it can be penalized. Inseason bycatch management measures establish fishing seasons for bycatch management and give the NOAA Fisheries/Alaska Regional Administrator the authority to close areas with high bycatch.

The Reasonable and Prudent Alternative (RPA) measures adopted from the most recent USFWS biological opinion on the short-tailed albatross stipulate the use of certain seabird avoidance measures and require that the take of more than four short-tailed albatross within 2 years trigger consultation with the USFWS and the potential closure of fisheries. To further reduce the possibility of the take of albatross impacting the fisheries, the NPFMC in 2001 required all longline vessels to adopt more stringent seabird avoidance methods.

A Licence Limitation Program (LLP) for groundfish vessels over 32 ft length overall (LOA) (with certain jig gear exceptions) and a moratorium on entry into the groundfish fisheries is in place for the BSAI and the GOA. An IFQ program is in place for sablefish in the BSAI and GOA, which includes provisions for community purchase of quota share. In the BSAI, the directed fishery for pollock is organized into cooperatives as authorized under the AFA. A multispecies CDQ program apportions 7.5-10 percent of all BSAI groundfish quota to 65 eligible western Alaska communities.

FMP 1 monitors the groundfish fishing effort through Federal and State reporting requirements and through the use of the North Pacific Groundfish Observer Program. All vessels between 60 ft and 125 ft LOA are required by regulation to have an observer on board 30 percent of the time; for vessels over 125 ft LOA this increases to 100 percent. For AFA and CDQ catcher boats greater than 60 ft LOA, one observer must be on board at all times, and for catcher processors and motherships, two observers must be on board at all times. The program also has observers at inshore processing plants. An additional monitoring tool is the reporting requirements for BSAI and GOA vessels that submit daily or weekly logbooks including information on the composition of catch and the locations of the hauls. The ADF&G also collects data from fish tickets at the point that catch is sold. Mandatory vessel monitoring systems (VMS) for all directed Atka mackerel, pollock, and Pacific cod fishing verify vessel location.

Alternative 2 – Adopt a More Aggressive Harvest Management Policy

This policy would maximize biological and economic yield from the resource while still preventing overfishing of the groundfish stocks. Such a management approach would, among other things, be based on the best scientific information available, take into account individual stock and ecosystem variability, and continue to work with other agencies in protecting threatened and endangered species. A more aggressive harvest strategy would be implemented based upon the concept that the present policy is overly conservative and that higher harvests can be taken without overfishing the target groundfish stocks. This policy assumes that fishing at the recommended levels would have no adverse impact on the environment, except in specific cases that are known and mitigated. For the full text of the alternative, see Section 2.6.3.

Example FMP 2.1

Example FMP 2.1 illustrates a more aggressive harvest strategy than Alternative 1 by removing many of the existing constraints from the fisheries. Example FMP 2.1 is described in full in Table 4.2-1. As the policy is based on an assumption that the impacts of fishing on the environment are generally known and mitigated, the precautions currently built into the existing TAC-setting process will be alleviated. The buffer between the ABC level and the OFL is removed, and the maximum OY for the groundfish stocks in the BSAI is released from its 2 million mt cap and allowed to float as the sum of the OFLs for the BSAI groundfish stocks. Additionally, example FMP 2.1 removes the precautionary element of the current FMPs that decreases F_{ABC} linearly with biomass when the biomass falls below a specific reference level.

Example FMP 2.1 also removes physical constraints from the fisheries by repealing the various closure areas currently in place. The fishery would be returned to an open-access scenario, where time and area closures, gear restrictions, and prohibited species catch restrictions are repealed. The potential impact of the groundfish fisheries on Steller sea lions, however, means that the current mitigating suite of protection measures that constrain fishing around rookeries and haulouts and protect Steller sea lion prey species (pollock, Pacific cod and Atka mackerel) when at low biomass levels would remain in place (Figures 4.2-2 and 4.6-1; specific details on the example FMP 2.1 map are provided in Section 4.2.3). This is required by the ESA to avoid determinations of jeopardy and adverse modification. The same applies to the impact of groundfish fishing on short-tailed albatross, with the consequent take limits remaining in effect.

The federally-mandated effort limitation program for the directed BSAI pollock fishery, enacted under the AFA, would remain in place, with its accompanying CDQ allocation, but all other effort limitation programs (such as the sailfish IFQ program and the multispecies CDQ program) would be repealed. Reporting requirements would remain in place, in order to keep track of the impact of the fisheries, but the observer program, except as federally mandated by the AFA, would be repealed, as would VMS requirements.

Example FMP 2.2

A more moderate illustration of Alternative 2, example FMP 2.2, also represents a more aggressive harvest strategy than Alternative 1. Example FMP 2.2 is described in full in Table 4.2-1. In this case, the mechanisms for setting ABC and TAC remain the same as in the current FMPs (FMP 1 for further detail), but the existing regulatory capped maximum OY of 2 million mt in the BSAI would be removed in favor of a maximum OY equaling the sum of individual groundfish ABCs in the BSAI. Additionally, bycatch reduction incentives and

bycatch restrictions would be repealed, other than those related to PSC limits or IR/IU. Under the assumption that fishing does not have an impact on the environment other than what is generally known and mitigated, the more stringent seabird avoidance measures enacted in 2001 would be repealed, leaving only the mitigation measures recommended by USFWS to avoid jeopardy or adverse modification for short-tailed albatross. Closure areas in example FMP 2.2 mirror those in FMP 1 (Figure 4.2-3; specific details on the example FMP 2.2 map are provided in Section 4.2.3).

Alternative 3– Adopt a More Precautionary Management Policy

This policy would seek to accelerate the existing precautionary management measures through community or rights-based management, ecosystem-based management principles and, where appropriate and practicable, increased habitat protection and additional bycatch constraints. Under this approach, additional conservation and management measures would be taken as necessary to respond to social, economic or conservation needs, or if scientific evidence indicated that the fishery was negatively impacting the environment. This policy recognizes the need to balance many competing uses of marine resources and different social and economic goals for fishery management. For the full text of the alternative, see Section 2.6.4.

Example FMP 3.1

Example FMP 3.1 illustrates a management approach that accelerates precautionary management measures by increasing conservation-oriented constraints on the fisheries where necessary, formalizing precautionary practices in the FMPs, and initiating scientific review of existing practices as a necessary precursor to the decision of how best to incorporate adequate precautions. Example FMP 3.1 is described in full in Table 4.2 1.

Example FMP 3.1 implements changes to the TAC-setting process following a comprehensive review. Precautionary practices such as setting TAC less than or equal to the ABC, and specifying MSSTs for Tiers 1-3 in accordance with National Standard Guidelines, would be formalized in the FMP. Sharks and skates would be removed from the Other Species management category and given their own TACs, and criteria to do the same for other target stocks would be developed. Efforts to develop ecosystem indicators to be used in TAC-setting, as per ecosystem management principles, would be accelerated.

In order to balance the needs of social and economic stability with habitat protection and resource conservation, a review would be conducted of the existing system of closure areas in the BSAI and the GOA (for closure areas under FMP 3.1, see Figure 4.2-4 and Section 4.2.3), and evaluate them against a Marine Protected Area (MPA) methodology to be developed as part of this alternative. The NPFMC and NOAA Fisheries would also seek to initiate joint consultation and research with USFWS to develop fishing methods that reduce incidental take of threatened and endangered species. To mitigate any adverse impacts of fisheries management decisions on fishing communities, and to comply with other national directives, formal procedures would be implemented to encourage increased participation of Alaska Natives in fishery management.

Example FMP 3.1 recognizes that the anticipated community or rights-based management programs may address bycatch reduction objectives (a review of bycatch rates under existing such programs is initiated),

but in the meantime a moderate reduction of PSC limits will be initiated as an intermediary step. Additionally, PSC limits for crab, herring and salmon would be authorized in the GOA, in addition to the halibut PSC limits authorized under the current GOA FMP. Effective monitoring and timely reaction to change in the environment and the fisheries would be enhanced through improvements in the observer program and third party verification of economic data.

Example FMP 3.2

Example FMP 3.2 implements the acceleration of existing precautionary measures on a more rapid timeline than example FMP bookend 3.1. Example FMP 3.2 is described in full in Table 4.2-1. Rather than reviewing existing practices prior to incorporating increased precaution, this bookend implements changes to many aspects of the FMPs concurrently with the initiation of scientific research efforts necessary to bring management measures in line with a precautionary policy.

Example FMP 3.2 significantly accelerates precautionary management by incorporating an uncertainty correction into the estimation of ABC for all species. Additionally, OY would be specified separately for each stock or stock complex rather than for the groundfish complex as a whole (i.e., OY would be set as a formula rather than as a range, eliminating the BSAI 2 million mt OY cap), and would be set equal to the respective stock or stock complex's TAC. The current precautionary practice of setting TAC less than or equal to ABC would be formalized in the FMP. Example FMP 3.2 would also incorporate stock-specific biological reference points in the tier system where scientifically justifiable. This could result in Tier 3 rockfish stocks, for example, being capped at $F_{60\%}$ rather than $F_{40\%}$. In implementing this bookend, criteria would be developed for specifying MSSTs for Tiers 4-6, along with a list of priority candidate stocks; and the development of criteria for moving stocks from the Other Species and Nonspecified Species management categories would minimally result in sharks and skates being given their own TACs.

Example FMP 3.2 also reexamines the existing closure system in the BSAI and the GOA. The bookend sets a guideline of 0-20 percent of the EEZ (3 to 200 nm) to be closed as a MPA, of which no more than 5 percent should be completely closed to commercial fishing (designated No-Take Marine Reserve). The remainder of the closed area is designated as no-bottom-contact MPA. The objective of these measures is to provide greater protection to a full range of marine habitats within the 1,000-meter (m) bathymetric line (Figure 4.2 5; specific details on the example FMP 3.2 map are provided in Section 4.2.3). The guideline aims to provide greater protection for a wide range of species, from Steller sea lions to slope rockfish to prohibited species, while at the same time respecting traditional fishing grounds and maintaining open area access for coastal communities. Additionally, the bookend would extend the existing bottom-trawl ban on pollock to the GOA.

Additional conservation benefits would be realized in example FMP 3.2 through the comprehensive rationalization of all fisheries (except those already part of a cooperative or IFQ program.) In adopting rationalization programs such as cooperative-style programs with built-in community protections, habitat and bycatch concerns would also be addressed by reducing concentrated effort in the fisheries. To increase precaution regarding bycatch, PSC limits would be significantly reduced (and set for all prohibited species in the GOA), but would not be expected to act as a proportionate restraint on the fisheries due to the incentives for bycatch reduction under cooperatives, or other bycatch incentive programs implemented as necessary under this bookend.

In accordance with ecosystem principles, the NPFMC and NOAA Fisheries would seek to initiate joint consultation and research with USFWS to develop fishing methods that reduce incidental take of all seabird species. Formal procedures would also be implemented to increase consultation with and representation of Alaska Natives in fishery management.

Effective monitoring and timely reaction to change in the environment and the fisheries would be enhanced through increase of observer coverage and improvements to the observer program, as well as an increase in the use of VMS and the range of economic data collected from industry.

Alternative 4 – Adopt a Highly Precautionary Management Policy

This policy represents an extremely precautionary approach to managing fisheries under scientific uncertainty. It shifts the burden of proof to the users of the resource and the NPFMC/NOAA Fisheries to demonstrate that the intended use would not have a detrimental effect on the environment. It would involve a strict interpretation of the precautionary principle. Management discussions would involve and be responsive to the public, but would decrease emphasis on industry and community concerns in favor of ecosystem processes and principles. This policy assumes that fishing does produce adverse impacts on the environment, but due to a lack of information and uncertainty, we know little about these impacts. The initial restrictive and precautionary conservation and management measures would be modified or relaxed when additional, reliable scientific information becomes available. For the full text of the alternative, see Section 2.6.5.

Example FMP 4.1

Example FMP 4.1 illustrates a fishery management plan where current levels of fishing are reduced and other precautionary restrictions are implemented until scientific research shows that the fisheries have no adverse effect on the sustainability of the resource and its environment. Example FMP 4.1 is described in full in Table 4.2-1.

Accordingly, example FMP 4.1 would substantially reduce the potential of adverse environmental impacts of the fisheries. A modified TAC-setting process would create a more substantial buffer between ABC and the OFL by setting the fishing mortality rate at $F_{75\%}$ for all Steller sea lion prey species (pollock, Pacific cod and Atka mackerel) and for rockfish (as long-lived, slow-growing species). Also, the max F_{ABC} for each stock or stock complex in Tiers 1-5 would be adjusted downward based on the lower bound of a confidence interval surrounding the survey biomass estimate. Optimum yield would be specified separately for each stock or stock complex rather than for the groundfish complex as a whole (i.e., OY would be set as a formula rather than as a range, eliminating the BSAI 2 million mt OY cap), and would be set equal to the respective stock or stock complex TAC. The current precautionary practice of setting TAC less than or equal to ABC would be formalized in the FMP. For species managed as members of a stock complex, rather than setting TAC as the aggregate of the individual members' ABCs, the max_{ABC} value for each component stock would be determined and the TAC set equal to the lowest value. Where sufficient biological information is available, such as with EBS pollock, TAC would be distributed on a smaller spatial scale. MSSTs would be determined for all tiers.

To further mitigate the possibility of the fisheries having a detrimental biological and ecosystem impact, 20 to 50 percent of the EEZ would be designated as No-Take Marine Reserve (i.e., no commercial fishing) covering the full range of marine habitats within the 1,000-m bathymetric line (Figure 4.2-6; specific details on the example FMP 4.1 maps are provided in Section 4.2.3). As part of this area in the Aleutian Islands, a Special Management Area would be established to protect coral and other live bottom habitats. The closed area would include spawning reserve areas for intensively fished species. Under the FMP 4.1 example, comprehensive trawl exclusion zones would be set to protect all Steller sea lion critical habitat, and trawling itself would be restricted to only those fisheries that cannot be prosecuted with other gear types (i.e, the flatfish fisheries).

In an effort to reduce waste and the risk of adverse impact to the environment, existing PSC limits would be halved under this bookend, as would bycatch (discard) and incidental catch rates. IR/IU would be extended to all target species. Stringent PSC limits would be set for salmon, crab and herring in the GOA, and as information becomes available, bycatch limits would be set for non-target species also. Protection measures would be set for all seabird species.

Because this policy alternative necessitates greater research and data-gathering efforts, example FMP 4.1 would expand observer coverage to 100 percent for all vessels over 60 ft LOA and require 30 percent observer coverage on vessels presently exempted from observer coverage (i.e., vessels under 60 ft LOA). VMS would be made mandatory for all groundfish vessels, as would motion-compensated scales for weighing all catches at sea or at shore-based processors. Cooperative research and data-gathering programs would be initiated as well to expand the use of traditional knowledge in fisheries management.

Example FMP 4.2

Example FMP 4.2 expands the precautionary principles of Alternative 4 by suspending all fishing until the fisheries can be shown to have no adverse effect on the resource and its environment. The TAC for all species would be set at zero. All areas of the EEZ would be closed to all fishing (e.g. commercial, recreational, and subsistence) (Figure 4.2-7; specific details on the example FMP 4.2 map are provided in Section 4.2.3); bycatch and incidental catch, as well as the take of seabirds and marine mammals, would then necessarily be reduced to zero.

Scientific research and data-gathering efforts would continue. When a fishery can be shown to pose no significant threat of adverse biological and environmental impacts, or if adverse effects can be successfully mitigated through use of fishery-specific regulations, the measures illustrated by this FMP bookend would be relaxed to allow fishing to resume.

Under this FMP illustration, it is assumed that each groundfish fishery currently conducted in federal waters in the BSAI and GOA would be individually reviewed by the NPFMC and NOAA Fisheries. Upon completion of this review (which may take up to 2 years), the agency would certify those fisheries that have no significant adverse impacts on the environment and authorize fishing under a specific set of regulations. If a fishery is found by this review to produce significantly adverse environmental effects, and mitigation measures can not be designed to mitigate those effects, that fishery would not be certified and would remain closed until more scientific information is known.

The Preliminary Preferred Alternative

The preliminary Preferred Alternative represents a management approach that incorporates forward looking conservation measures that address differing levels of uncertainty. This management approach has, in recent years, been labeled the precautionary approach. As part of its policy, appropriate measures would be considered and adopted that accelerate the precautionary, adaptive management approach through community or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and, where appropriate and practicable, increased habitat protection and bycatch constraints. This management approach recognizes the need to balance many competing uses of marine resources and different social and economic goals for fishery management, and will utilize and improve upon the NPFMC and NOAA Fisheries' existing open and transparent process to involve the public in decision-making. For the full text of the alternative, see Section 2.6.9.

Example FMP PPA.1

Example FMP PPA.1 illustrates a conservative management approach that continues current risk-averse management practices, increases conservation-oriented constraints on the fisheries as appropriate, formalizes precautionary practices in the FMPs, and initiates scientific review of existing practices in order to assess and improve fishery management. Example FMP PPA.1 is described in full in Table 4.2-2.

Example FMP PPA.1 builds on the existing conservative procedure for determining acceptable biological catch and annual quotas. The example FMP implements changes to the TAC-setting process following a comprehensive review. Precautionary practices such as setting TAC less than or equal to the ABC, and specifying MSSTs for Tiers 1-3 in accordance with National Standard Guidelines, would be formalized in the FMP. The NPFMC and NOAA Fisheries would continue to use and improve harvest control rules to maintain a spawning stock biomass with the potential to produce sustained yields on a continuing basis, and to distribute allocations by area, season, and gear as appropriate. Efforts to develop ecosystem indicators to be used in TAC-setting, as per ecosystem management principles, would be continued.

In order to balance the needs of social and economic stability with habitat protection and resource conservation, the NPFMC would develop a MPA efficacy methodology, including the development of definitions, program goals, objectives and criteria for establishing MPAs. Additionally, existing habitat and bycatch area restrictions would be maintained. Measures are also retained to protect ESA-listed species. To minimize bycatch, a moderate reduction of PSC limits in the BSAI will be initiated, and PSC limits for crab, herring and salmon would be authorized in the GOA, including salmon savings areas to be triggered by reaching PSC limits. Effective monitoring and timely reaction to change in the environment and the fisheries would be enhanced through improvements in the observer program and existing reporting requirements.

Existing programs to address excess capacity and overcapitalization are maintained under this example FMP, with continued development of rights-based management to be undertaken as needed. In order to mitigate any adverse impacts of fisheries management decisions on fishing communities, and to comply with other national directives, formal procedures would be implemented to encourage increased participation of Alaska Natives in fishery management.

Example FMP PPA.2

Example FMP PPA.2 accelerates adaptive, precautionary management by increasing conservation measures that provide a buffer against uncertainty, instituting research and review of existing measures, and expanding data collection and monitoring programs. Example FMP PPA.2 is described in full in Table 4.2-2.

Example FMP PPA.2 significantly accelerates precautionary management by incorporating an uncertainty correction into the estimation of ABC for all species. The current precautionary practice of setting TAC less than or equal to ABC would be formalized in the FMP. Example FMP PPA.2 would also develop and implement criteria for using key ecosystem indicators in TAC-setting, and other precautionary practices. This could result in Tier 3 rockfish stocks, for example, being capped at $F_{60\%}$ rather than $F_{40\%}$. In implementing this bookend, criteria would be developed for specifying MSSTs for priority stocks in Tiers 4-6. The development of criteria to manage target and non-target species consistently, and for moving stocks from the Other Species and Nonspecified Species management categories, would begin with breaking sharks and skates out of the Other Species group for TAC-setting.

Example FMP PPA.2 also reexamines area restrictions in the BSAI and the GOA by reviewing the existing system of closure areas in the BSAI and the GOA (for closure areas under example FMP PPA.1, see Figure 4.2-8 and Section 4.2.3), and evaluating them in conjunction with developing MPAs. The example FMP considers adopting MPAs, with a guideline of 0-20 percent of the EEZ (3 to 200 nm) to be closed as a MPA, of which no more than 5 percent should be completely closed to commercial fishing (designated No-Take Marine Reserve). The remainder of the closed area is designated as no-bottom-contact MPA. The objective of these measures is to provide greater protection to a full range of marine habitats within the 1,000 m bathymetric line (Figure 4.2-9; specific details on the example FMP PPA.2 map are provided in Section 4.2.3). This area would incorporate an Aleutian Islands management area to protect coral and live bottom habitat, and also any modification to the 2002 Steller sea lion closures. The closed area may also mitigate adverse effects that may occur due to fishing. The guideline aims to provide greater protection for a wide range of species, from Steller sea lions to slope rockfish to prohibited species, while at the same time respecting traditional fishing grounds and maintaining open area access for coastal communities. Additionally, the bookend would extend the existing bottom-trawl ban on pollock to the GOA.

To increase precaution regarding bycatch, existing PSC limits would be reduced and set for all prohibited species in the GOA, and appropriate inseason closure areas would be identified in the GOA. The achievement of these bycatch reductions is expected to be realized through the comprehensive rationalization of all fisheries (except those already part of a cooperative or IFQ program), which reduces concentrated effort in the fisheries, or through bycatch incentive programs implemented in this example FMP.

In accordance with ecosystem principles, the NPFMC and NOAA Fisheries would seek to cooperate with USFWS to develop fishing methods that reduce incidental take of all seabird species in the longline and trawl fleets. Formal procedures would also be implemented to increase consultation with and representation of Alaska Natives in fishery management.

Increases in observer coverage and improvements to the observer data that is collected would enhance effective monitoring and timely reaction to change in the environment and the fisheries. Additionally, the bookend explores programs that would expand the type of economic data collected from industry.

4.2.3 Description of the Example FMP Maps

FMP 1 Map

This map (Figure 4.2-1) illustrates six different types of spatial management areas across the BSAI and GOA. All of these areas currently comprise the spatial management regime for 2003. These areas are color-coded on the map as follows:

Yellow:	3 nm No-Transit Zones (No-Take Reserves)
Blue:	No Hook-and-Line and Pot or Trawl for the Steller Prey Species
Red:	No Steller sea lion Prey Species Trawling
Red Hatching:	Harvest Limit Closures for Atka Mackerel and Pacific cod
Tan Hatching:	Additional Atka Mackerel Closures
Blue Hatching:	Additional Pollock Closures

Bathymetry data to 1,000 m is also color-coded, running from dark green (zero m) to a pale beige (1,000 m). In the legend itself, the titles for measures developed specifically for protection of Steller sea lions are printed in blue. Bycatch closures that are triggered once a PSC limit is reached are not included on the map or in the spatial analysis since in recent years some of these measures are no longer triggered.

FMP 1 illustrates the current Steller sea lion-related closures west of 144°W longitude necessary for the Alaska groundfish fisheries to avoid a determination of jeopardy and adverse modification. The Steller sea lion population west of 144°W longitude have been listed as endangered under the ESA since 1990. The portion of the Steller sea lion population found east of 144°W longitude are currently listed as threatened.

The No-Transit zones shown on the map have been in effect since 1992 and restrict traffic of all water-born vessels, unless under a federal scientific permit. These no-transit zones are in effect year-round.

The No Hook-and-Line and Pot or Trawl for the Steller sea lion Prey Species are those areas that currently restrict the harvest of Steller sea lion prey species by H&L and Pot and both bottom and pelagic trawl gear. These restrictions too are in effect year-round.

The areas labeled No Trawl, restrict both bottom and pelagic trawl fishing for Steller sea lion prey species and are in effect year-round.

Harvest limit closures for Atka mackerel and Pacific cod: In the BSAI, Atka mackerel fishing is closed all year within 20 nm of Steller sea lion rookeries and haulout sites in waters east of 178°W. In waters west of 178°W, constraints on Atka mackerel harvest are triggered once 40 percent of the Aleutian Islands Atka Mackerel TAC is reached. After the 40 percent threshold is reached in the Aleutian Islands, all other Atka mackerel fishing must occur outside of 20 nm of Steller sea lion rookeries and haulout sites. To prevent localized depletion of prey species, Pacific cod (which are managed under a single TAC for the BSAI) may not be targeted west of 178°W after 40 percent of that BSAI TAC is reached.

Additional Atka mackerel closures: The western GOA (waters west of 144°W longitude) is closed to directed fishing for Atka mackerel all year.

Additional pollock closures: The entire Aleutian Islands subarea is closed to the targeting of pollock year round. Both the GOA and the Bering Sea have additional seasonal pollock restrictions.

Non-Steller sea lion related spatial closures that were analyzed in the example FMP 1, FMP 2.2 and FMP 3.1 maps (Figures 4.2-1, 4.2-3, and 4.2-4).

Closed to All Trawl

- Nearshore Bristol Bay Closure Area: Bering Sea area closed since 1996.
- Pribilof Islands Area Habitat Conservation Zone: Bering Sea area closed since 1994.
- Southeast Outside Closed Area: closed since 1997.
- Chiniak Gully Research Area: closed from August 1 through September 20.

Closed to Non-Pelagic Trawl

- Red King Crab Savings Area: Bering Sea area closed year-round since 1996.
- Kodiak Type I Crab Closure Areas: GOA area closed year-round.
- Kodiak Type II Crab Closure Areas: GOA area closed between February 15 to June 15.

Closed to All Fishing

- Cape Edgecumbe (Sitka) Pinnacles: closed to groundfish fishing since 1997.

All of these spatial measures (closures), when combined, protect 10.7 percent of the EEZ (Table 4.2-3). We have also defined "fishable area" for purposes of this analysis, as those waters over the Continental Shelf and Continental Slope, or all waters to a depth of 1,000 m. In doing so, we provide a different view of the management area and this information is useful when assessing the impacts of these spatial measures on groundfish resources and essential fish habitat which is found in most cases, to be associated with the Continental Shelf and Continental Slope. When examined in this way, the spatial measures described for example FMP 1 protect 28.8 percent of the fishable area of the BSAI and GOA. (Table 4.2-3).

Example FMP 2.1 Map

This map (Figure 4.2-2) illustrates six different types of spatial management areas across the BSAI and GOA. These areas are color-coded on the map as follows:

Yellow:	3 nm No-Transit Zones (No-Take Reserves)
Blue:	No Hook-and-Line and Pot or Trawl for the Steller sea lion Prey Species
Red:	No Steller sea lion Prey Species Trawling
Red Hatching:	Harvest Limit Closures for Atka mackerel and Pacific cod
Tan Hatching:	Additional Atka mackerel Closures
Blue Hatching:	Additional pollock Closures

The example FMP 2.1 map illustrates only the current Steller sea lion-related closures west of 144°W longitude, which remain in place to avoid a jeopardy determination under the ESA.

The No-Transit zones have been in effect since 1992 and restrict traffic of all water-born vessels, unless under a federal scientific permit. These zones are in effect year-round.

The No Hook and Line and Pot or Trawl for the Steller sea lion Prey Species zones restrict the fishing of Steller sea lion prey species by Hook-and-Line and Pot and both non-pelagic and pelagic trawl gear. These too are in effect year-round.

The No-Trawl areas restrict fishing Steller sea lion prey species by non-pelagic and pelagic trawl gear and are also in effect year-round.

Harvest Limit Closures for Atka mackerel and Pacific cod: in the BSAI, targeting of Atka mackerel is closed all year within 20 nm of Steller sea lion rookeries and haulouts east of 178°W longitude. West of 178°W, Atka mackerel harvest limits apply at 40 percent of the Aleutian Islands Atka mackerel TAC. After the 40 percent of Atka mackerel TAC is reached in the Aleutian Islands, all other Atka mackerel must be caught outside 20 nm of Steller sea lion rookeries and haulouts. To prevent the localized depletion of prey species fish, Pacific cod (which are managed under a single TAC for the BSAI) may not be targeted west of 178°W after 40 percent of the TAC is reached.

Additional Atka mackerel Closures: The western GOA west of 144°W longitude is closed to Atka mackerel fishing all year.

Additional Pollock Closures: The entire Aleutian Islands subarea is closed to the targeting of pollock. Both the GOA and the Bering Sea have additional seasonal pollock restrictions.

All of these spatial measures (closures), when combined, protect 4.2 percent of the EEZ, and 14.6 percent of the fishable area of the BSAI and GOA (Table 4.2-4).

Example FMP 2.2 and Example 3.1 Maps

The maps for example FMP 2.2 and FMP 3.1 are identical to the example FMP 1 map (Figures 4.2-3 and 4.2 4). See Tables 4.2-5 and 4.2-6 for descriptive statistics on these FMPs.

Example FMP 3.2 Map

Example FMP map 3.2 (Figure 4.2-5) illustrates seven types of spatial management areas that are color-coded as follows:

Yellow:	3 nm No-Transit Areas
Purple:	No Steller sea lion Prey Species Trawling MPA
Dark Green:	No Steller sea lion Prey Species Hook-and-Line, Pot, or Trawl Fishing MPA
Blue:	No-Take Marine Reserves
Pink:	No-Bottom-Contact Trawling MPA
Light Green:	Eastern GOA No Steller sea lion Prey Species Hook-and-Line, Pot, or Trawl MPA
Red Circles:	Steller sea lion Critical Habitat

Bathymetry down to 1,000 m is also color-coded, running from dark green (zero m) to a pale beige (1,000 m). In the legend itself, the titles for measures developed specifically for protection of Steller sea lions are printed in blue.

The map has been developed from the following information and data sources: bathymetry; EFH from the 1997 environmental assessment; Steller sea lion critical habitat; 2002 Steller sea lion closures; survey and bycatch data for coral and sponge distribution; historical commercial fisheries catch data; location of ports; locations of test and study areas, and review of various alternatives and potential mitigation measures being developed by the NPFMC EFH Committee. Using the latest data to determine Steller sea lion foraging behavior, a 15 nm buffer from the coastline in the GOA and Bering Sea was applied, as were 15 nm buffers from Steller sea lion rookeries and haulouts in the Aleutian Islands.

The ADF&G groundfish statistical areas were applied as management units to designate five different types of management areas including: No-Take Marine Reserves, No Steller sea lion Trawling MPA, No Bottom Trawling MPA, No Steller sea lion Hook-and-Line, Pot or Trawl MPA, and in the eastern GOA, No Steller sea lion Hook-and-Line, Pot or Trawl and No-Trawl MPA.

The ADF&G statistical areas are one degree wide (approximately 35 nm), and a half-degree tall (30 nm). ADF&G subdivides their statistical areas at 3 nm from the shoreline. These management units, when grouped into larger spatial regions, are presumably large enough to 1) prevent habitat fragmentation, 2) protect large portions of HAPC, 3) form clearly defined, manageable, navigable, and enforceable alternatives, 4) provide contiguous fishing restrictions for protecting spawning populations, key critical habitat, demersal and pelagic fish species, marine mammals, and 5) where possible, provide open areas near fishing ports.

From a biological and fishery point of view, the ADF&G groundfish statistical areas boundaries are arbitrary, and thus do not always line up with the spatial distribution of significant biological and habitat resources. Therefore a 40 percent rule was applied: when 40 percent of a statistical area was covered with a significant concern by a weighted qualitative factor, the area was tagged as a No-Take Marine Reserve, or one of the other MPAs. This effect was normalized to a certain extent during the analysis because a statistical area that did not quite meet the benchmark would not be so designated (e.g., an area where only 35 percent was overlaid would be left entirely open). In some cases, areas would be totally closed to create a contiguous closure necessary to capture a broad range of inshore to offshore habitats.

The benthic fishing habitat used in this analysis generally follows the continental shelf and goes out to a depth of 1,000 ms (500 fathoms), which area we consider here to constitute the fishable bottom habitat. Perpendicular blocks of closures sweep from the shore to a 1,000-m contour, protecting a full range of habitat types. Area afforded protection by example FMP 3.2 spatial measures, when combined, protect 17.8 percent of the EEZ, and 47.8 percent of the fishable area of the BSAI and GOA (Table 4.2-7).

Aleutian Islands

The Aleutian Islands subarea merits special attention since the fishing grounds are all relatively nearshore. Example FMP 3.2 defines a 5 percent No-Take Reserve and 15 percent MPA rule across a full range of habitat types. Where in the Bering Sea and GOA 15 nm buffers from shore were described in the frameworks, in the Aleutian Islands a 15 nm buffer was applied to each of the Steller sea lion rookeries and

haulouts. This buffer does not specifically implement a no-take reserve or other MPA, but is likely to be a weighting factor in any future development of potential restrictions.

Due to the narrow Continental Shelf along the Aleutian Island chain, and the fact that State statistical areas are utilized in this Programmatic SEIS, a much higher percentage of fishable area (79.9 percent) is afforded protection in the example FMP 3.2 in the Aleutian Islands area compared to the Bering Sea (32.6 percent) and the western/central GOA (65.6 percent).

Thirty-nine Steller sea lion rookeries fall within Steller sea lion Critical Habitat, nineteen of which are located in the Aleutian Islands. All rookeries carry a 3 nm No Transit Area with an additional 10 nm (or more) no Steller sea lion prey species trawling area. The No Transit Areas are the only No-Take reserves in the Aleutian Islands. These closures have been in effect since 1992 – all of them are logical candidates for no-take marine reserves or MPAs. Many of these Steller sea lion No Transit/No-Trawl areas are clustered and thus transfer easily to corresponding ADF&G statistical areas. Although other non-Steller sea lion prey species fisheries such as the rockfish fisheries occur inside these Steller sea lion No-Trawl areas, these areas were weighted heavily in the analysis as representing conceptual No-Take reserves and less so for gear specific MPAs. Coral data from bycatch and trawl survey data, as well as from NOAA dive test areas, were used in the development of the No-Take marine reserve examples.

The MPAs considered in this analysis include: No Steller sea lion Prey Species Hook-and-Line, Pot and Trawling MPAs, No Steller sea lion Prey Species Trawling MPAs, and No Bottom Contact Trawling MPAs. To encompass existing closures areas, the Pacific cod Hook-and-Line and Pot and Trawling restrictions were extended to constitute No Steller sea lion Prey Species Hook-and-Line and Pot MPAs, if not already closed as No-Take Reserves. Other current Steller sea lion prey species restrictions for Atka mackerel, pollock (the entire Aleutian Islands subarea), and Pacific cod trawl fisheries were closed to prey species trawling. And to better protect habitat, a suite of MPAs for No Bottom Contact Trawling (currently defined simply as Non-Pelagic Trawling) were created around areas of low and medium fishing intensity areas where bycatch or trawl survey data contained coral and sponge. Some of these low intensity areas can be seen on Bowers Ridge, west of Attu Island, and west of the Bogoslof District.

Through the development of these No-Take Reserves and MPAs, the 40 percent rule was applied to ADF&G statistical areas in order to illustrate a contiguous and fairly non-fragmented environment available for marine mammals, benthic habitats, seabird avoidance and spawning fish populations without jeopardizing commercial fisheries.

Bering Sea

Guidelines in the example FMP 3.2 MPAs and EFH component define a 5 percent No-Take Reserve and a 15 percent MPA rule across a full range of habitat types. With its broad, muddy and sandy shelf, the Bering Sea is much different than the Aleutian Islands. The Bering Sea also contains many legacy areas established for habitat protection, such as the Near Shore Bristol Bay No-Trawl area, the Red King Crab No Non-Pelagic Trawl area, the Pribilof Habitat No-Trawl area, and a full suite of No Steller sea lion Prey Species Hook-and-Line and Pot and Trawl Areas. Other existing closures in the Bering Sea have been used for the creation of No-Take Reserves and MPAs examples: five No Transit zones and their associated 10 nm No Steller sea lion Prey Species Trawling areas with various sized Hook-and-Line and Pot closures. A large section of the

Steller sea lion conservation area (the Bogoslof District) is closed to all Steller sea lion prey species fishing (with the small exemption area near Dutch Harbor for catcher vessels less than 60 ft LOA.

Fifteen nm buffers from the shore (as described in the example FMP 3.2 Steller sea lion measures component to mimic recent Steller sea lion foraging research, fishing effort, known locations of Steller sea lions and other marine mammals, spawning areas, crab protections areas, and essential fish habitat) were used as weights in the designation of the No-Take Reserves and the MPAs. As in the Aleutian Islands, we have applied a 40 percent rule to state statistical areas to illustrate contiguous and fairly non-fragmented environments.

The Bogoslof foraging area (district) now contains significant No-Take Reserves, with the rest of the Bogoslof foraging area covered by No Steller sea lion Prey Species Hook-and-Line and Pot and Trawl areas. A suite of No Hook-and-Line and Pot and No Steller sea lion Trawl areas develop moving east along the lower Bering Sea shelf. The 3 nm statistical areas around the land bordering the rookeries are listed as No-Take Marine reserves. Other No-Take Reserves include a large area around Cape Piece Walrus Protection area and the Walrus Island Steller sea lion rookery in the Pribilof Islands.

The Pribilof Habitat Conservation and Near Shore Bristol Bay Areas remain closed to trawling, and the Red King Crab Area remains closed to non-pelagic trawling. The two northernmost haulouts and the haulouts in the Pribilofs are closed to Steller sea lion Prey Species Hook-and-Line and Pot and Trawling.

Along the northwestern shelf of the Bering Sea, three large No-Bottom-Contact Trawling MPAs were developed to coincide with the no-bottom-trawling areas the Essential Fish Habitat Committee is considering to protect these same benthic habitats. These general areas are being considered as potential sites for a rotational MPA, where areas are periodically opened and closed to particular types of fishing.

GOA – West of 144°W

Like the BSAI, the example FMP 3.2 for the GOA (west of 144°W) sets a five percent No-Take Reserve and a 15 percent MPA rule across a full range of habitat types. Unlike the Bering Sea, however, the GOA is somewhat more restrictive as to where effective closures can be designed while leaving areas open near fishing ports.

Fifteen Steller sea lion rookeries are listed in the GOA, thirteen of which carry 3 nm No transit areas and 10 nm No Steller sea lion Prey Species No-Trawl areas. These areas, along with other existing Steller sea lion restrictions, such as the 15 nm buffers from the shore (as were described in the frameworks to mimic recent Steller sea lion foraging research), the Type I & II No-Trawl areas, and the Chiniak Gully Research area (seasonal), as well as known locations of Steller sea lions and other marine mammals (such as harbor seals), pollock spawning areas, bycatch and survey data of coral and sponge, the shelf's gullies, canyons and breaks, and essential fish habitat – all served as weighted measures for the illustration of the No-Take Reserves and the MPAs in the FMP 3.2.

The 40 percent rule was again applied to the ADF&G statistical areas to illustrate large non-fragmented environments.

In order to protect a full range of habitat, perpendicular tracks of No-Take Marine Reserves were created from the shoreline to the 1,000-m break. Where possible, the No-Take Reserves were created at Steller sea lion rookeries and where existing No Hook-and-Line and Pot and Trawl for the Steller sea lion Prey Species closures coexist such as Marmot Island, south Chignik in RPA district 4, around selected Steller sea lion rookeries and haulouts, and within RPA Districts 10 and 11 (below the Bogoslof District). Other areas that were designated No-Take Reserves for purposes of our analysis included a section of the shelf and slope below the Shumagin islands, Portlock Banks, and smaller sections of the shelf below Prince William Sound (PWS).

No Steller sea lion Prey Species Hook-and-Line and Pot and Trawl Areas were created using the weighted measure when Steller sea lion restrictions were dominant but did not reach the benchmark for creating No-Take Reserves. No-Trawl for the Steller sea lion Prey Species and No-Bottom-Contact Trawling closures were created with the same sets of weighted criteria.

GOA – East of 144°W

As in the BSAI, the example FMP 3.2 for the GOA (east of 144°W longitude) defined a five percent No-Take Reserve and a 15 percent MPA rule across a full range of habitat types.

The current suite of Steller sea lion closures do not transit east of 144°W, but the Steller sea lions east of 144°W are listed as threatened and therefore we included an example measure to provide some protection to this part of the population. The state No-Trawl closure east of 140°W was strengthened in this illustration to include an MPA for No Hook-and-Line and Pot or Trawl for Steller sea lion Prey Species. This No-Trawl and No Hook-and-Line and Pot or Trawl for Steller sea lion Prey Species MPA also includes a smaller area near Icy Bay and Cape Yakataga.

The example No-Take Reserves were developed to protect habitat in areas with low to medium fishing intensity and within 3 nm of three Steller sea lion rookeries. The Sitka Pinnacles are included within one of the illustrated No-Take Reserves.

Example FMP 4.1 Map

There are two versions of the example FMP 4.1 map. Both illustrate the same suite of spatial closures. The difference is cosmetic. Figure 4.2-11 uses the same color (magenta) scheme as the example FMP 4.2 map (Figure 4.2-7). Both of these example FMPs serve to illustrate a major shift in management policy. Unlike current management practice, where generally speaking, anything is permitted unless specifically prohibited (e.g., the maps are blank unless closures/restrictions are shown), the example FMP 4.1 maps illustrate a management policy where everything is closed unless shown open. Figure 4.2-6 provides a map illustration where the magenta is converted to the color scheme used in maps for example FMPs 1 through 3.2 to provide the reader with a version to make comparison among those maps easier.

Figure 4.2-11 illustrates four types of spatial management areas that are color-coded as follows:

Yellow:	3 nm No Transit Areas/Steller sea lion Critical Habitat
White:	Areas Open to Fishing

Magenta Hatching: Areas Open to Commercial Fishing Except Trawling
Magenta (solid): No-Take Marine Reserves

Bathymetry information to 1,000 m is also color-coded, running from dark green (zero m) to a pale beige (1,000 m). In the legend itself, the titles for measures developed specifically for protection of Steller sea lions are printed in blue.

The map has been developed from the following information and data sources: bathymetry; essential fish habitat from the 1997 environmental assessment (insert citation); Steller sea lion critical habitat; 2002 Steller sea lion closures; survey and bycatch data for coral and sponge distribution; historical commercial fisheries catch data; location of ports; locations of test and study areas; the Aleutian Islands special management area; public comments; and the legacy closures and restricted areas identified in Tables 4.2-1.

ADF&G statistical areas were applied as management units to designate open fishing areas, MPAs designated as No-Trawling areas (all species, all types of trawls), and No-Take Marine Reserves (where commercial fishing is prohibited). The ADF&G groundfish statistical areas are one degree wide (approximately 35 nm), and a half-degree tall (30 nm). ADF&G subdivides their statistical areas at 3 nm from the shoreline. These management units, when grouped into larger spatial regions, are presumably large enough to: 1) prevent habitat fragmentation; 2) protect large portions of HAPC; 3) form clearly defined, manageable, navigable, and enforceable alternatives; 4) provide contiguous fishing restrictions for protecting spawning populations, key critical habitat, demersal, pelagic fish species, and marine mammals; and 5) where possible, provide open areas near fishing ports.

From a biological and fishery point-of-view, the ADF&G statistical areas are arbitrary and do not always represent the spatial distribution of significant biological and habitat resources. Therefore, a 25 percent rule was applied in the following manner: When 25 percent of a state statistical area was covered with a significant concern, the area was designated as either a No-Take Marine Reserve or a No-Trawl MPA. This effect was normalized to a certain extent during the analysis because a statistical area that did not quite meet the benchmark would not be so designated (e.g., an area where less than 25 percent was overlaid would be left entirely open, as was the case when attempting to comprehensively close Steller sea lion Critical Habitat) In some cases, areas were shown totally closed even if the 25 percent benchmark was not reached for purposes of illustrating a contiguous closure to capture a broad range of inshore to offshore habitats.

Area afforded protection by example FMP 4.1 spatial measures, when combined, protect 19.0 percent of the EEZ, and 51.1 percent of the fishable area of the BSAI and GOA (Table 4.2-8). The primary difference between this map and the FMP 3.2 map is that most of the spatial closures used in this illustration are of the form of No-Take Marine Reserves where all commercial fishing is prohibited. This form of closure is intended to illustrate an extremely precautionary policy that places emphasis on protecting marine mammals, target groundfish stocks, and essential fish habitat.

Aleutian Islands

The Aleutian Islands subarea merits special attention since the fishing grounds are nearshore. Guidelines in the Alternatives tables state that 20 to 50 percent of each management area, including all representative habitats contained therein, should be managed as a No-Take Marine Reserve. The Aleutian Islands Special

Management Area illustrated in example FMP 4.1 covers a contiguous area specifically to protect coral and other living substrates and Steller sea lion critical habitat. Although the Aleutian Islands Special Management Area was originally intended to encapsulate the entire Aleutian Islands subarea, excluding a swath of fishable area to Unimak Pass, this is not shown on the map since the Bogoslof district and RPA districts 10 and 11 are already analyzed as No-Take Marine Reserves in their own regions.

The benthic fishing habitat used in this analysis was down to 1,000 ms (500 fathoms), which we considered fishable bottom habitat. In most cases, perpendicular blocks of closures sweep from one side of the 1,000 ms contour to the other, protecting a full and broad range of habitat.

Thirty-nine Steller sea lion rookeries fall within Steller sea lion Critical Habitat; the Aleutian Islands contains nineteen of them. All rookeries carry a 3 nm No-Transit zone and an additional 10 nm No Steller sea lion Prey Species Trawling area. These closures have been in effect since 1992, all of them making excellent candidates for No-Take Marine Reserves under the Alternative 4 policy. Many of these areas are clustered and would transfer easily to the corresponding ADF&G stat areas. Areas that currently have high densities of No-Trawl, Hook-and-Line, and pot fishing were designated No-Take Marine Reserves in the example FMP 4.1 illustration. A good example of this can be seen in the area from 170°W to Seguam Pass. Blocks on the Petrel Banks were closed due to high coral bycatch. A string of closed statistical areas follows the Petrel Banks because these areas have seen at least some coral bycatch and are relatively unstudied. One block of the Southeastern side of Petrel Banks (North slope) was left open. Historically high catch rates in this area and a need to create at least some open areas for fishing prompted this action. No-take reserves along Steller sea lion Critical Habitat and the 1,000 ms contour created significant contiguous benthic and biologic protection in the Aleutian Islands.

Bering Sea

The example FMP 4.1 guidelines specified that 20 to 50 percent of each management area, including all representative habitats contained therein, should be managed as No-Take Reserves. Specifically mentioned in the example FMP 4.1 were submarine canyons, Unimak Pass, old Crab Pot Sanctuary, areas near the Pribilof Islands, area southwest of St. George, Misty Moons, and the Red King Crab Savings Area. These examples were recommended by public stakeholders as candidate areas for analysis in this Programmatic SEIS.

Steller sea lion Critical Habitat (including the entire Steller Sea Lion Conservation Area) was closed to trawling as an illustration of a No-Trawl MPA or designated as No-Take Marine Reserves, as were other legacy closures such as the Near Shore Bristol Bay No-Trawl area. And since the Bering Sea has a much broader benthic plane, more options were available to analysts for illustrating a management scenario meeting the criteria of example FMP 4.1 by protecting a full range of habitat types using a combination of both No-Trawl MPAs and No-Take Marine Reserves.

For purpose of this analysis, we designated Bogoslof (RPA district 9) as a No-Take Marine Reserve, with blocks of reserve leading east to include large portions of old Crab Pot Sanctuary Area, thereby illustrating continued protection of this important crab spawning area and benthic habitat. A track of No-take Marine Reserve leaves the old Crab Pot Sanctuary area running north to intercept the coast near Cape Pierce and the Walrus Islands closures. A track of No-Trawl MPA extends from Cape Pierce to the west, intercepting the

No-Trawl Marine Reserve formed by the Pribilof Conservation Area (PCA). Below the PCA is Misty Moon canyon; a No-Take Marine Reserve was designated here because of historically high bycatch of corals and sponges. An open fishing area was created both above and below the Misty Moon area to permit groundfish fishing where catches have been historically good, but with lower bycatch. For purposes of illustrating this policy, other large No-Take Marine Reserves were designated along the inner, middle, and outer Bering Sea shelf breaks. The five northern Steller sea lion haulouts became No-Take Marine Reserves using coincident ADF&G statistical areas. Unlike the Aleutian Islands, the area analysis includes only that part of the ADF&G statistical area that coincides with 1,000 m bathymetry. The exception is that the Bogoslof foraging area is included in the percentage of Bering Sea EEZ calculation.

GOA – West of 144°W

As with the Aleutian Islands and Bering Sea, the GOA (west) guidelines suggested that 20 to 50 percent of each management area, including all representative habitats contained therein, should be managed as No-Take Marine Reserves. Specific areas mentioned for analysis were the Davidson Banks, Shumagin Islands, the Type I & II area to the southeast of Kodiak Island, and the Gulf shelf breaks. Unlike the Bering Sea , the GOA is somewhat more restrictive as to where effective closures can be created while leaving some areas open.

Steller sea lion Critical Habitat, Steller sea lion current closures (trawl, Hook-and-Line, and pot), pollock spawning areas, fishing ports, and the shelf's gullies, canyons and breaks, were taken into account in the creation of No-Take Marine Reserves and No-Trawl MPAs. In order to protect a full range of habitat, perpendicular tracks of No-Take Marine Reserves, using state statistical areas, were created from the shoreline to the 1,000-m break. Where possible, these No-Take Marine Reserves were created at Steller sea lion rookeries and where current Steller sea lion no-trawl and no hook-and-line and pot closures coexist, such as Marmot Island and RPA Districts 4, 10 and 11. Other areas that were designated as No-Take Marine Reserve in this example FMP included the Shumagin Islands (an important pollock spawning area and high catch area), a portion of Davidson Bank, Portlock Banks shelf break, and blocks of areas in and around PWS. Unlike the Aleutian Islands, the area analysis includes only that part of the ADF&G statistical area that coincides with 1,000 m bathymetry.

GOA – East of 144°W

Because the Southeast Outside District does not include Steller sea lion Critical Habitat but currently has a trawl ban east of 140°W, this area was analyzed separately from the western and central GOA. Again, a suggested 20 to 50 percent of each management area, including all representative habitats contained therein, should be managed as No-Take Marine Reserves. The Sitka Pinnacles are the only area currently designated as a "no-take" among the example FMPs. Coral and sponge bycatch, shelf breaks, and proximity to ports were used in the illustration of No-Take Marine Reserves. The No-Take Marine Reserves protect a full range of habitat from the coast to the 1,000 m (fishable area) shelf break. Unlike the Aleutian Islands, the area analysis includes only that part of the ADF&G statistical area that coincides with 1,000 m bathymetry.

Figure 4.2-6 contains all of the above spatial measures, but uses the same color-scheme as the maps for example FMP 1 through FMP 3.2:

Yellow:	3 nm No-Transit Areas
Purple:	No Steller sea lion Prey Species Trawling MPA
Dark Green:	No Steller sea lion Prey Species Hook-and-Line (Hook-and-Line), Pot, or Trawl Fishing MPA
Blue:	No-Take Marine Reserves
Pink:	No-Bottom-Contact Trawling MPA
Light Green:	Eastern GOA (GOA) No Steller sea lion Prey Species Hook-and-Line, Pot, or Trawl MPA
Red Circles:	Steller sea lion Critical Habitat

Example FMP 4.2 Map

The example FMP 4.2 map (Figure 4.2-7) illustrates a management plan that completely closes the EEZ to groundfish fishing until such time that NPFMC and NOAA Fisheries have reviewed each fishery and determined whether it results in any significant adverse impacts on the physical or biological environment. This example FMP illustrates one way to apply the extremely precautionary policy of Alternative 4. As described above, the process of review, certification, and development of fishery-specific regulations could take up to two years, at which time those fisheries authorized to harvest groundfish, would be permitted. This map would then change for those fisheries, with certain areas opening to them. Some fisheries may never receive authorization. As fisheries are authorized, their fishery-specific maps would begin to look similar to the example FMP 4.1 map illustrations, depending on the fishery (Table 4.2-9).

For purposes of this programmatic analysis, the example FMP 4.2 map provides an opportunity to estimate the economic and social value of the commercial groundfish fisheries and realize the impact of a temporary suspension of groundfish fishing. Such a management plan serves as a useful bookend for comparing this example FMP scenario with example FMP 4.1 that illustrates a significantly reduced fishery in lieu of total suspension.

Example FMP PPA.1

The map for example FMP PPA.1 (Figure 4.2-8) is identical to the map for example FMP 3.1. The map is described in detail above.

Example FMP PPA.2

The map for example FMP PPA.2 (Figure 4.2-9) is identical to the map for example FMP 3.2. The map is described in detail above.

This page intentionally left blank.